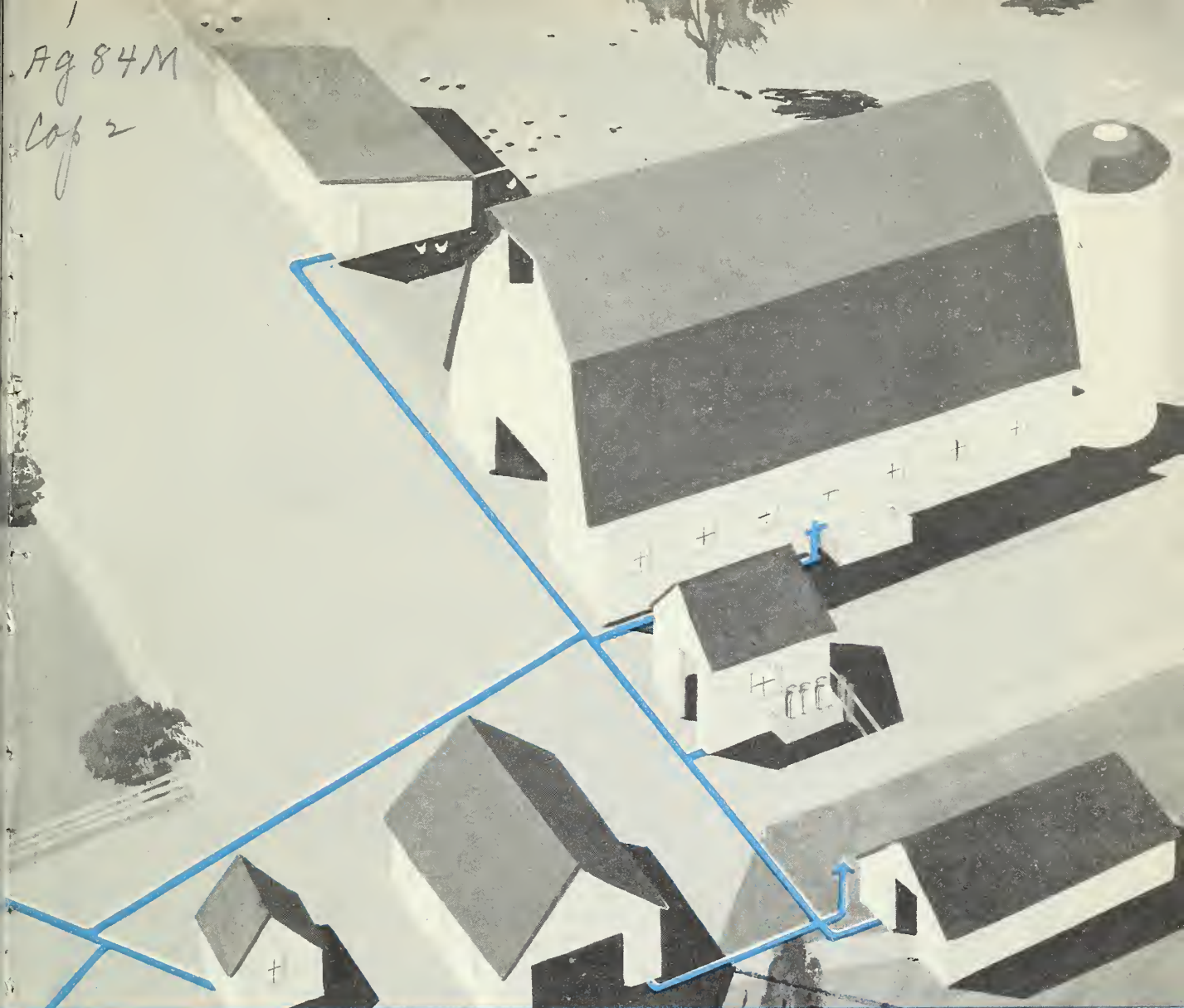


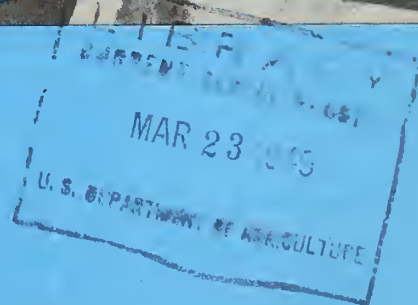
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Cap 2



Planning



the **ELECTRIC WATER SYSTEM** and **PLUMBING FOR YOUR FARMSTEAD**

GETTING an electric water system and plumbing system on a farm requires three distinct activities; planning, getting materials, and making the installation. The planning always should be the job of the farmer and his family. In planning, they should seek the advice of their county agent, their co-op electrification adviser, local supplier, or other qualified help available.

After the plans are complete and the fixtures chosen, someone else can select the other materials and make the installation to fit those plans. But it is the family's job to decide what the water is going to be used for and where.

Too often the planning is carelessly done or is turned over to someone else. Then when the system is installed it does not meet fully the farm and family needs.

On many farms, the system is put in piecemeal over a period of years. A plan that is carefully worked out in the beginning makes it possible to do this without discarding and replacing previously installed equipment or rearranging pipes and fixtures as new parts of the system are added.

Frequently Used Terms

Gallons per hour	The measure most commonly used for telling the rate at which water is pumped by water system pumps.
Gallons per minute	1 gallon per minute is 60 gallons per hour. The larger size pumps, such as irrigation and drainage pumps, are commonly rated in gallons per minute instead of in gallons per hour.
Shallow-well pump	Often called suction pump. Used when the depth to water while pumping is not more than 22 feet.
Deep-well pump	Used when the depth to water while pumping is more than 22 feet.
Pressure tank	The water-storage tank used with most electric water systems. The tank is closed, and pumping water in compresses air in the top. The compressed air provides the pressure necessary to force the water through the system.
Service pipes	The pipes that carry water to the buildings.
Distribution pipes	The pipes within a building that carry water to the places where it is used.
Frostproof hydrant	An outdoor faucet built so that all water in it above frost depth drains away into the ground every time the faucet is closed, so there is no danger of the water freezing and bursting the hydrant.
Sink	A fixture designed for washing utensils.
Lavatory	A basin used principally for washing hands and face.
Water closet	(Often referred to as closet.) A fixture for receiving wastes discharged from the human body.
Toilet	A room or space reserved for personal grooming and discharge of human wastes.
Soil pipe	A drainage pipe that handles wastes from a water closet.
Waste pipe	A drainage pipe that handles wastes from fixtures other than water closets.
Cesspool	A covered pit with open jointed lining into which the raw sewage from the house flows and from which the liquids seep into the soil.
Septic tank	A covered watertight underground tank through which sewage from the house flows, and in which the solid portions of the sewage are held until they are satisfactorily decomposed.
Seepage pit	A covered pit with open jointed lining into which liquid wastes other than raw sewage flows, and from which they seep into the soil.

PLANNING THE ELECTRIC WATER SYSTEM AND PLUMBING FOR YOUR FARMSTEAD

Your electricity offers your family an unmatched opportunity to have running water and a complete plumbing system. Electricity eliminates these handicaps: The heavy labor of hand pumping; the need for close, constant attention to your water system; and the need for large, expensive storage tanks necessary with gasoline, windmill, or hand-operated systems.

Why Planning Is Important

If your water and plumbing system is properly planned, installed, and maintained, it will give you water, convenience, and sanitation when and where you need them. On the other hand, improper planning may result in a system dangerous to health and expensive to operate.

Mistakes in electric wiring result in danger of shock to people and animals, danger of fire, burned-out electrical equipment, improperly operating equipment, and other difficulties.

Similarly, mistakes in planning or installing water and plumbing systems may result in polluted or contaminated water supplies, causing disease, or undesirable odors in houses and other buildings. Improperly installed equipment may also cause annoying noises, inconveniences, short life of equipment, and failure to get maximum benefits from your system. *So plan well to get the most from your water system.*

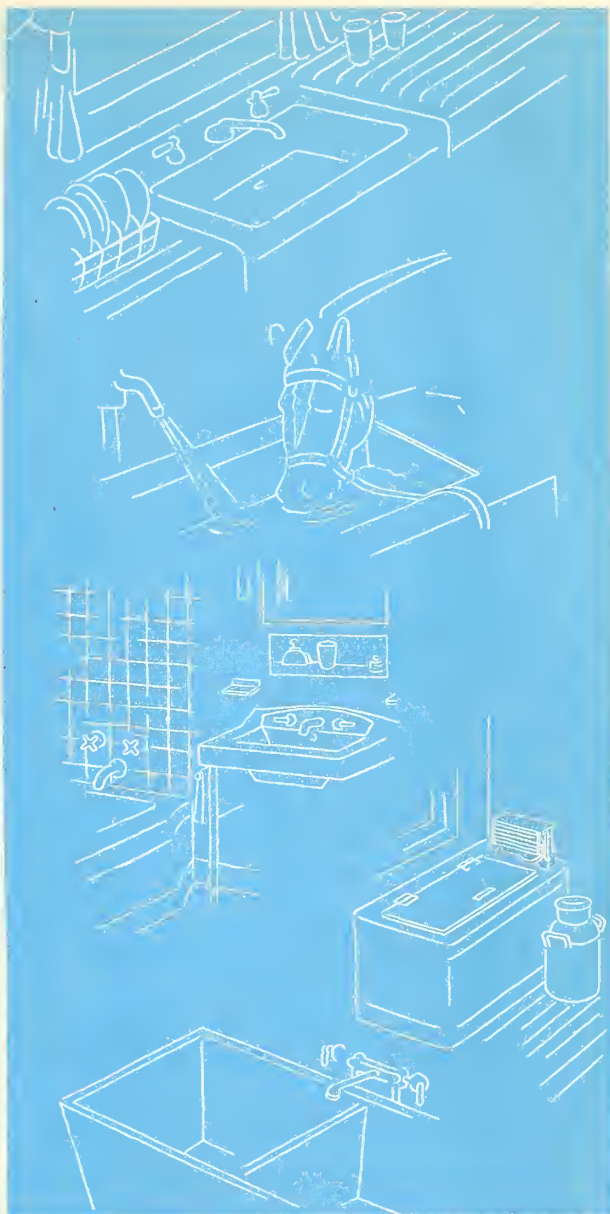
What This Booklet Does

This booklet will help you plan your system so that it will serve you best. It is not intended to show you how to install your water system. The installation of piping and plumbing is a job requiring special knowledge and tools that few farm families have or will acquire. However, without becoming experts, you and your family can learn from this booklet some simple, important facts about water systems and plumbing.

How To Use This Booklet

Read it through. Study it carefully. Discuss it with your family. You will see that the sketches and plans represent common farm buildings. You will find that the methods used and the plans discussed can be adapted to your own farm.

Next, consider the uses and needs for water and plumbing on your farmstead. You will want your system to supply all of your present uses for water. In addition, you may want water for other purposes, such as a water closet in the new bathroom, lawn sprinkling, or garden watering.

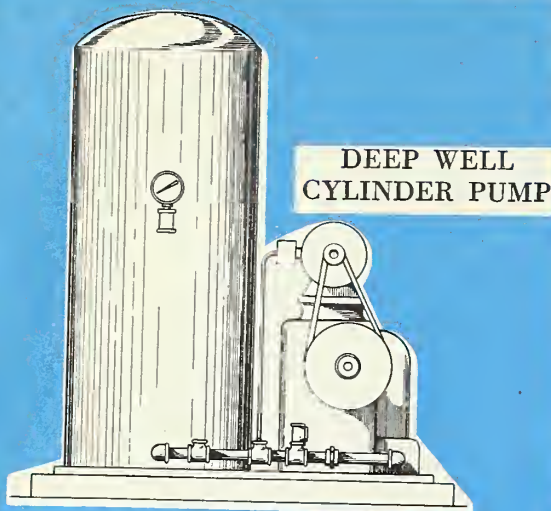


You probably will also want to use water in new locations. For example, you may want to wash clothes in the basement instead of the kitchen. Or you may want to supply water for your cows at individual drinking cups in the stable instead of at a trough in the barnyard.

Think in terms of your future needs, even if you do not plan to put in the complete system at first. Planning now for future uses will make it possible for you to put in the first parts of your system so that they can later be added to, rather than torn out and replaced.

For example, in planning a bathroom location, you may want to consider whether an existing room can be used, or whether it will be necessary to build an addition. How about a separate shower bath

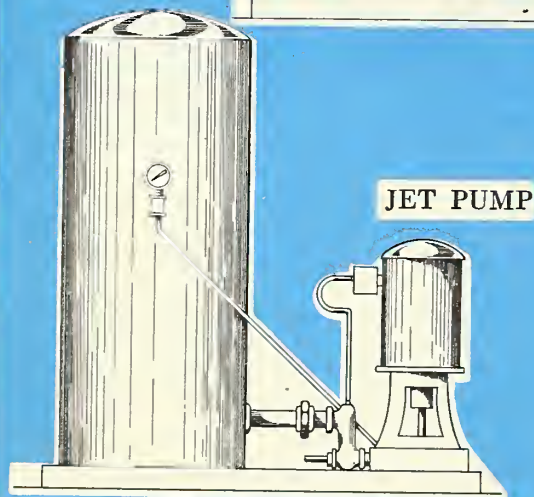
WHAT TYPE AND SIZE OF PUMP?



DEEP WELL
CYLINDER PUMP



SHALLOW WELL
PUMP



JET PUMP

for farm workers? Where should the septic tank and the septic tank disposal field be located? These are examples of questions that should be given careful thought at the very outset.

How About Your Well?

Will your well supply all of the water you will need, or will you have to improve it or drill a new one? A well that does not supply enough water for a hand pump will be even less adequate with an electric water system. If you are now using two or three wells, will one of them be adequate for all future needs or will you have to install water systems on more than one of them?

A safe water supply is very important. It is not good business to put a modern water system on an unsafe water supply, or in one likely to become contaminated. Consult your local health authorities or your county agricultural agent on proper protection for your well, both from surface drainage and sources of contamination, and from subsurface seepage. For further details, see *Farmers' Bulletin 1978, "SAFE WATER FOR THE FARM,"* available from the U. S. Department of Agriculture, Washington 25, D. C.

What Type of Pump to Buy?

Your pump must be selected to fit your well. Different manufacturers make many different styles of pumps of several types. With one exception, each type is described as either a shallow-well or a deep-well pump.

A shallow-well type pump can be used when the depth to water, at sea level, is not more than 22 feet when the pump is running. For each 1,000 feet elevation above sea level, the possible suction lift is reduced by about 1 foot. For example, if your farm is 5,000 feet above sea level, you can use a shallow-well pump only if the water in your well is not more than 17 feet lower than your pump.

Only the deep-well jet type of pump can be used in either shallow or deep wells, and even it should be installed differently in the two types of wells. For a shallow well the jet assembly is located in the pump housing or adjacent to it and obtains water from the well by suction like any other shallow-well pump. For a deep well the jet assembly is submerged in the water.

Some jet pumps will operate where the depth to water is several hundred feet. However, at these greater depths cylinder pumps are less expensive to operate. The amount of electricity used may not be as important as some other things, such as being able to place the pump away from the well. But it is probable that, if the depth to water is more than about 75 feet, power costs will be less with a cylinder type pump than with a jet pump.

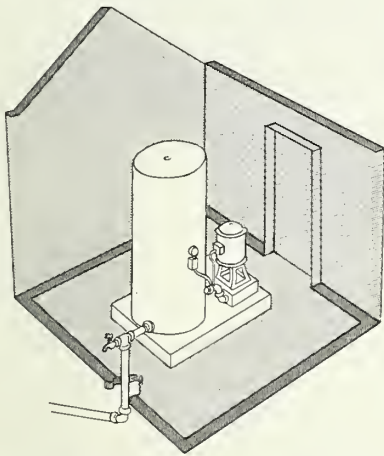
The Storage Tank With Your Pump

You will probably need a water-storage tank with your pump. The tank prevents the pump starting and stopping each time a little water is drawn. It also prevents frequent starts and stops when water is being drawn slowly.

Preventing these frequent starts and stops reduces wear on the pump and motor and reduces the amount of electricity used. However, some pumps do not stop running even if water is being drawn slowly from only one faucet. The amount of water that these pumps deliver changes as the amount being drawn changes. That is, they will continue to pump all the water needed even if several faucets are open. On some farms, these pumps are satisfactory without storage tanks.

An electric water system may have—but does not need—large elevated water-storage tanks on towers, hills or the upper part of buildings, such as are used with other types of power. Since an electric pump starts and stops automatically, it is not necessary to have a large reserve of water in storage, unless your well will not furnish water as fast as you need it.

For your electric system, therefore, you will probably want a pressure tank of either 42 or 80 gallons capacity. A 42-gallon tank will enable you to use about 8 gallons of water between the time when the pump automatically stops and the time when it automatically starts again. An 80-gallon tank will let you use about 16 gallons of water between each stop and start of the pump.



COMMON WATER REQUIREMENTS FROM AN ELECTRIC WATER SYSTEM

Use:	Amount (gallons per day)
Each member of family.....	50
Each milking cow.....	35
Each horse, dry cow, or beef cow.....	12
Each hog.....	4
Each sheep.....	2
Each 100 chickens.....	4



If you have a very large dairy herd or if you plan to water a garden larger than one-fourth acre, it would be desirable for you to use a 120-gallon tank. A tank of this size will supply about 25 gallons of water between each start and stop of the pump.

Size of Your Pump

One of the advantages of an electric water system is that it provides you with the water you need when you need it.

However, you will limit your pump's usefulness if you get one too small for your needs. For example, if your water system is to give you any assistance in fighting a fire, you will want to be able to use at least one $\frac{3}{4}$ -inch garden hose to its full capacity. A hose of this size will handle water at the rate of about 300 gallons per hour. Therefore you will want a pump that will deliver at least that much.

Everyone uses more water when it is easily available than when it must be pumped by hand. So you need to plan for this increased use. The following table may be used to estimate the amount of water that will be needed.

This table will give you a basis for estimating the amount of water that your pump will be called on to furnish on your farm. Your pump will be called on to deliver most of this water in a few short periods of time during the day—not throughout the entire day. So the pump should be a size that will furnish the entire daily need for water in 2 hours or less actual pumping time.

If your well will not furnish water this fast, you should put in a pump adapted to your well. Then you should provide enough water storage so that 2 hours of pumping plus the "active" storage capacity will equal your daily need.

WHERE TO PUT THE PUMP

Locating Your Pump

If you are putting in a deep-well cylinder type pump you will have to place it on the well curbing directly over the well. This will probably make it necessary for you to build a pump house over the well to protect the pump and motor from rain and freezing.

If you are putting in a shallow-well pump or a deep-well jet pump you can place it in any convenient location within the suction limits of the pump, so long as the pipe slopes continuously upward from the water in the well to the pump.

This means that you may be able to place your pump in the basement of your house, in your woodshed, or in some other protected location. In that way you can avoid building a separate shelter to protect it.

A pump pit is sometimes substituted for a pump house. This should be done only where the slope of the land makes it possible to drain the pit to the ground surface. Poor drainage from the pit allows moisture to collect and seep into the well. Any well into which surface water drains may become contaminated. Also, a damp pump pit is a dangerous place in which to use electrical equipment.

The large sketch on the top of the next page shows the plan of water service piping in the same farmstead pictured on the cover of this booklet.

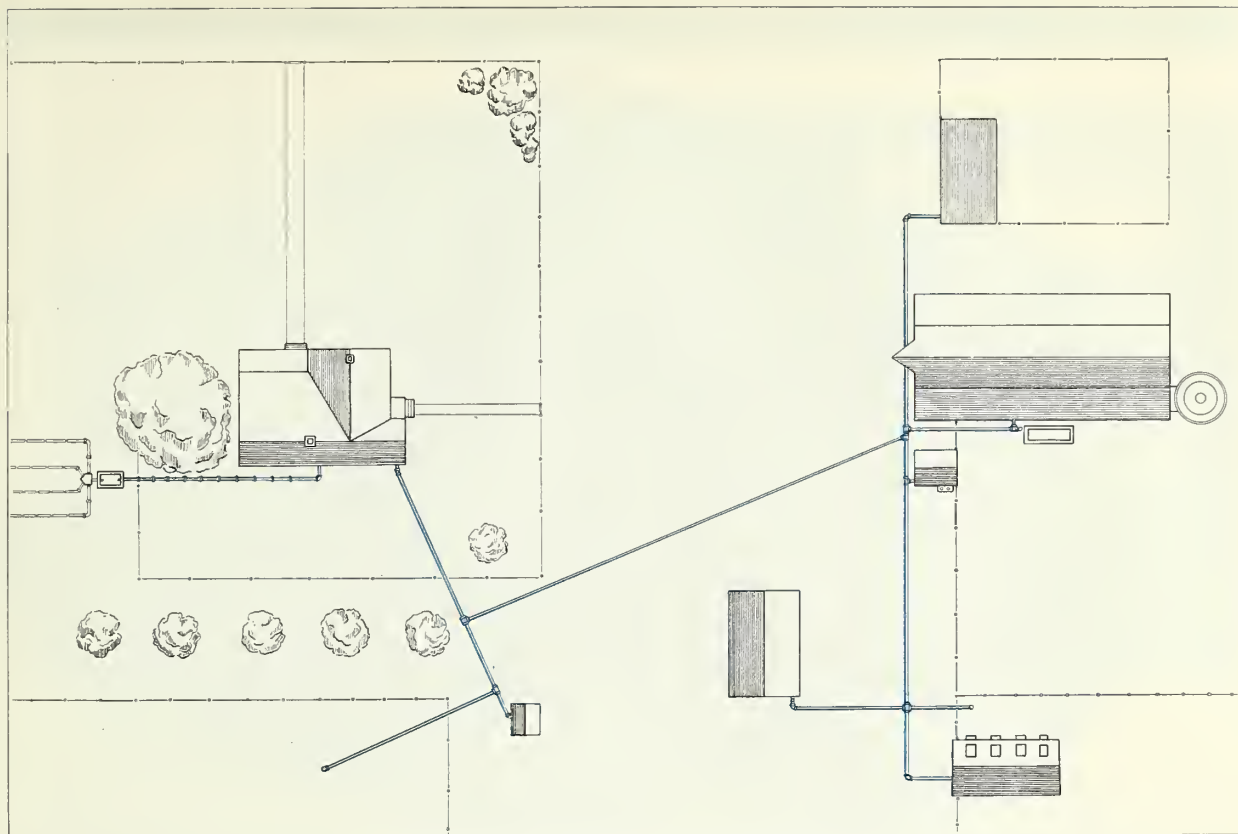
Water service piping is the part of your water system that carries the water from your storage tank to the distribution pipes in the various buildings. The term "service piping" also describes the pipes between the various buildings.

This piping should be laid so that it can be completely drained if necessary. It should be as short and as straight as possible. Long pipes, elbows, or angles cause a drop in pressure and reduce the flow of water.

You may find it best to run a pipe straight from your storage tank at or near your house to your barn, and to take off branches from this pipe to the poultry house, the hog house, the farm shop and other buildings, at the point where the pipe comes closest to each of those buildings. If any of the buildings in which you want water are beyond the barn, the main water line through the barn to them should be as straight and as short as it is practical to make it.

The pipes you put in should be large enough to deliver water at the full capacity of your pump at

Capacity of pump in gallons per hour	Length of Pipe												
	50 ft or less	75 ft	100 ft	150 ft	200 ft	300 ft	400 ft	500 ft	600 ft	700 ft	800 ft	900 ft	1000 ft
100	1/2" pipe												
125	1/2" pipe												
150													
175			3/4" pipe										
200													
225													
250													
275					1" pipe								
300													
325													
350													
375							1 1/4" pipe						
400													
425													
450													
475										1 1/2" pipe			
500													
525													
550													
575													
600												2" pipe	
625													
650													



PIPING IN YOUR FARM BUILDINGS

each main building, with not more than 5 pounds of pressure loss between the storage tank and the building.

The chart below will show you the size of pipe you will need to serve each of the buildings on your farmstead.

How To Use The Chart

Suppose your pump has a capacity of 350 gallons per hour, and there are 200 feet of pipe from your water-storage tank to your barn. About halfway down the column in the accompanying chart headed "Capacity of pump in gallons per hour," you will find a figure "350." Read across the page from "350" until you are in the column directly under 200 feet. You will notice that you are now in a part of the chart labeled "1-inch pipe." The figures given show that a pump with a capacity of 350 gallons per hour would use 200 feet of 1-inch pipe for a pump of this size.

If your water-storage tank is outside of your house, your water-distribution piping in the house will be a continuation of the water-service piping leading to the house. If the storage tank is in the house, the distribution piping begins at the tank.

Both copper tubing and galvanized pipe are used for distribution piping in the house. Either type

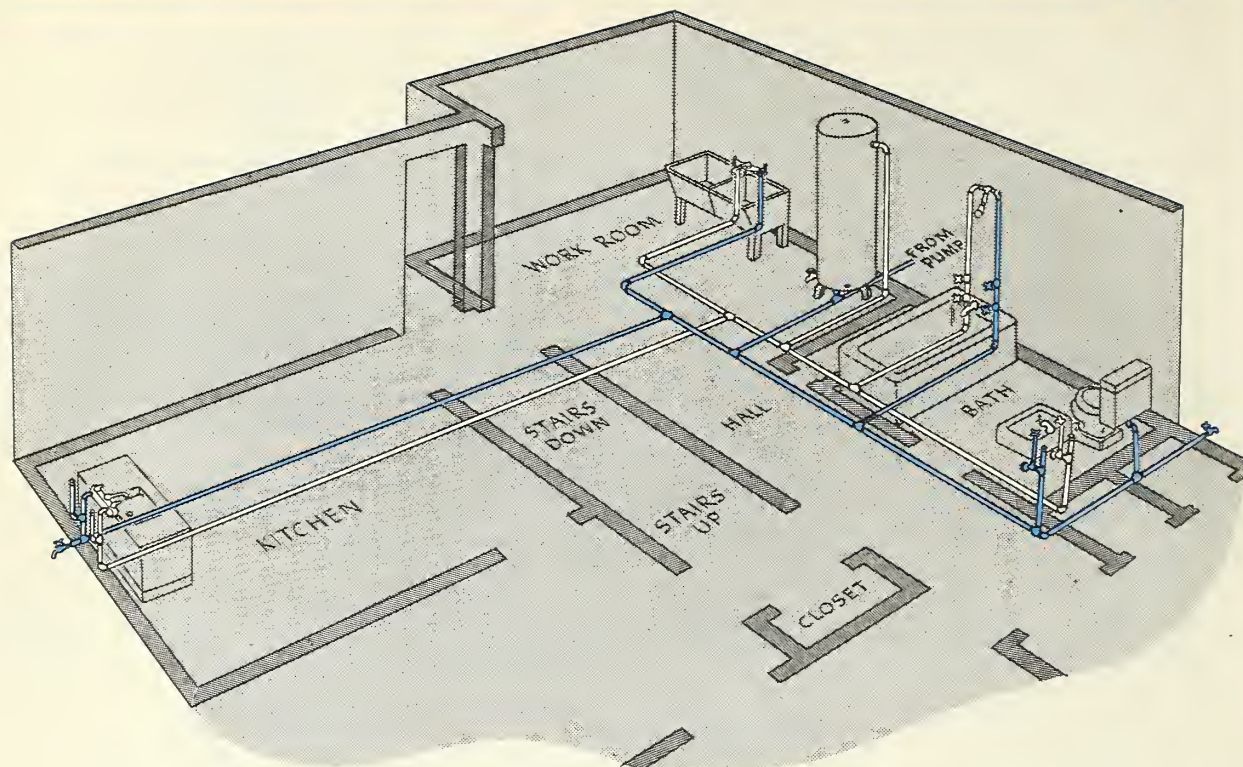
can make a satisfactory installation. Galvanized pipe is cheaper than copper tubing of the same size. However, it cannot be bent around corners like copper tubing and hence requires more labor to put in. Sometimes this additional labor cost offsets the saving in the cost of materials.

The distribution piping branches so that water is carried to all places where water is to be drawn from the system. It may pass through a water softener if one is installed. One branch leads to the water heater. From the heater it branches again to the various places where hot water is to be drawn from the system. (See sketch of house piping above.)

It will be necessary for you to determine where you are going to want both hot and cold water in order that the distribution piping may be put in to furnish it properly. The following table shows places where many farm families want it:

COMMON FARM HOUSEHOLD USES FOR HOT AND COLD WATER

Cold Water	Hot Water
Kitchen sink	Kitchen sink
Bathroom lavatory	Bathroom lavatory
Bathroom bathtub	Bathroom bathtub
Bathroom shower bath	Bathroom shower bath
Back porch lavatory or sink	Back porch lavatory or sink
	Laundry tubs



Cold Water	Hot Water
Laundry tubs	Washing machine
Washing machine	Farm workers' shower bath
Farm workers' shower bath	
Bathroom water closet	
Lawn watering	
Outside faucet for washing cars, screens, storm sash, house, etc.	

The charts below show the sizes of galvanized pipe or copper tubing that you will need. One example will show you how to use these charts: Suppose the length of pipe from the place where your water-service pipe enters the house to the most distant faucet (which may be on the bathroom on the second floor) is 30 feet. The first 10 feet carries water for 9 faucets, the next 12 feet carries water for 3 faucets,

and the last 8 feet for 1 faucet. Suppose galvanized pipe is to be used. Since the greatest length of pipe is 30 feet, you refer to the column headed "30 feet" in the chart for galvanized pipe. Read down this column until you are directly opposite the number of faucets to be served by each section of the pipe, as indicated in the column at left of the chart.

You will notice that the data for the first section of 10 feet of pipe and the second section of 12 feet of pipe are given under the heading, " $\frac{3}{4}$ -inch pipe," and for the third section of 8 feet of pipe under the heading, " $\frac{1}{2}$ -inch pipe." It will be apparent from the figures given in the chart that the first 22 feet of the pipe should be $\frac{3}{4}$ -inch size, and the last 8 feet, $\frac{1}{2}$ -inch size. If copper tubing were being used instead of galvanized pipe, you would use the chart for copper tubing in the same way.

Number of faucets served by pipe	Length of Pipe														
	10 ft	15 ft	20 ft	25 ft	30 ft	35 ft	40 ft	45 ft	50 ft	60 ft	70 ft	80 ft	90 ft	100 ft	
1	$\frac{1}{2}$ " pipe														
2						$\frac{3}{4}$ " pipe									
3 or more											1" pipe				

No. of faucets served by tubing	Length of Tubing														
	10 ft	15 ft	20 ft	25 ft	30 ft	35 ft	40 ft	45 ft	50 ft	60 ft	70 ft	80 ft	90 ft	100 ft	
1	3/8" tubing							1/2" tubing							
2	1/2" tubing														
3 or more								3/4" tubing							
														1" tubing	

Sinks and Bathrooms

The sink is a very important part of your kitchen—the workroom of your house. Since the location and installation of the sink are permanent, you should plan for complete modernization of your kitchen and install the sink so it will fit in this plan.

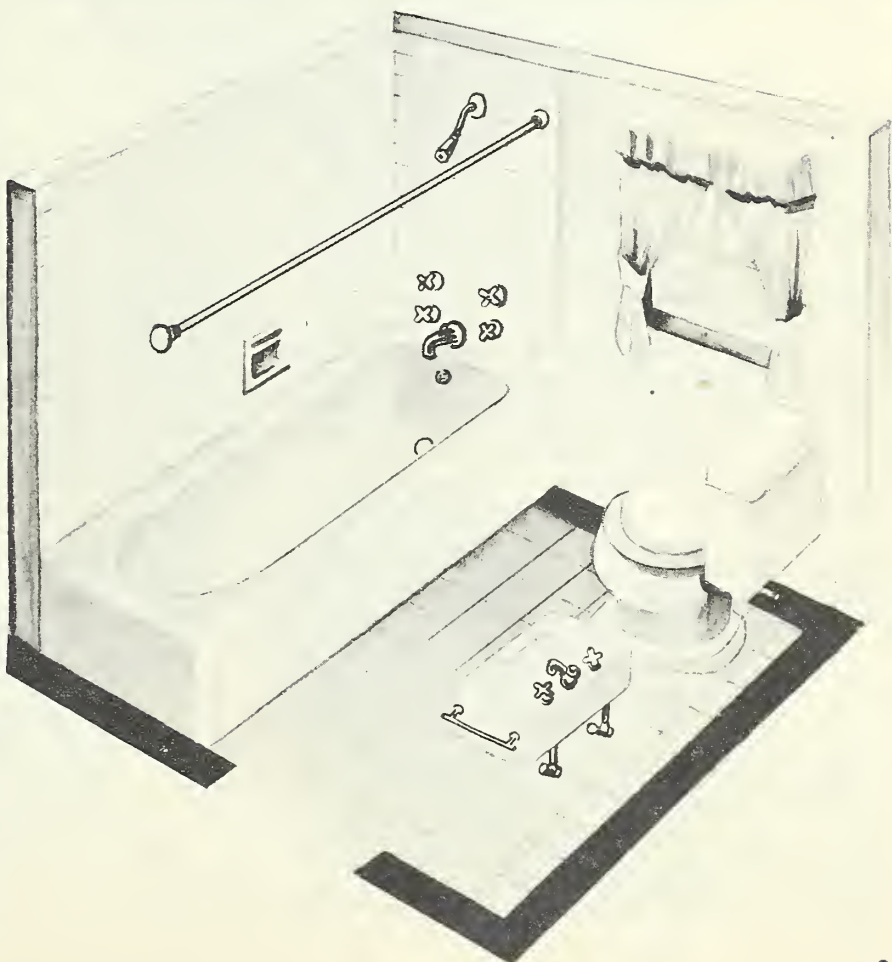
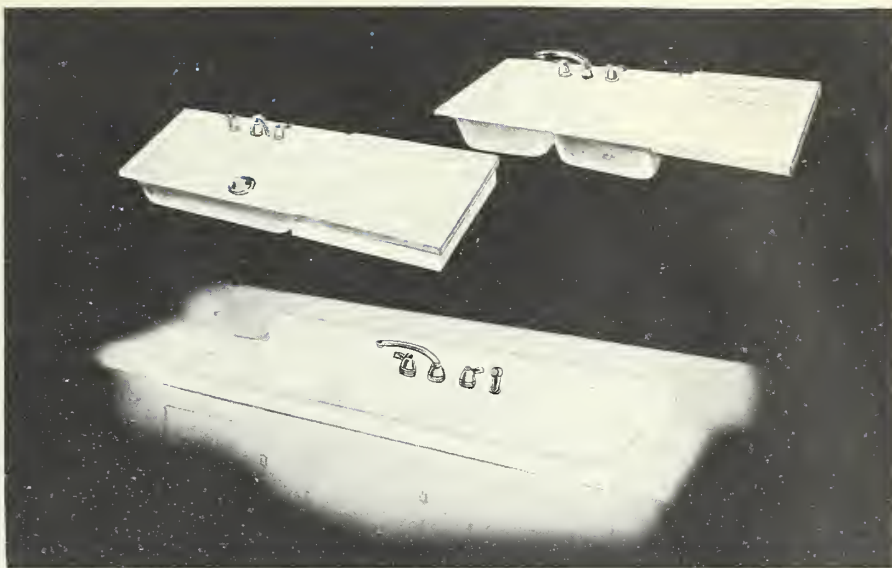
On this page are shown three different types of sinks suitable for farm use. The flat-rim sink, of which two types are shown, is built into the counter top, thus providing a work counter on each side of it. Both single-bowl and double-bowl sinks are available. The double-bowl ones are more expensive but are usually worth the difference in cost.

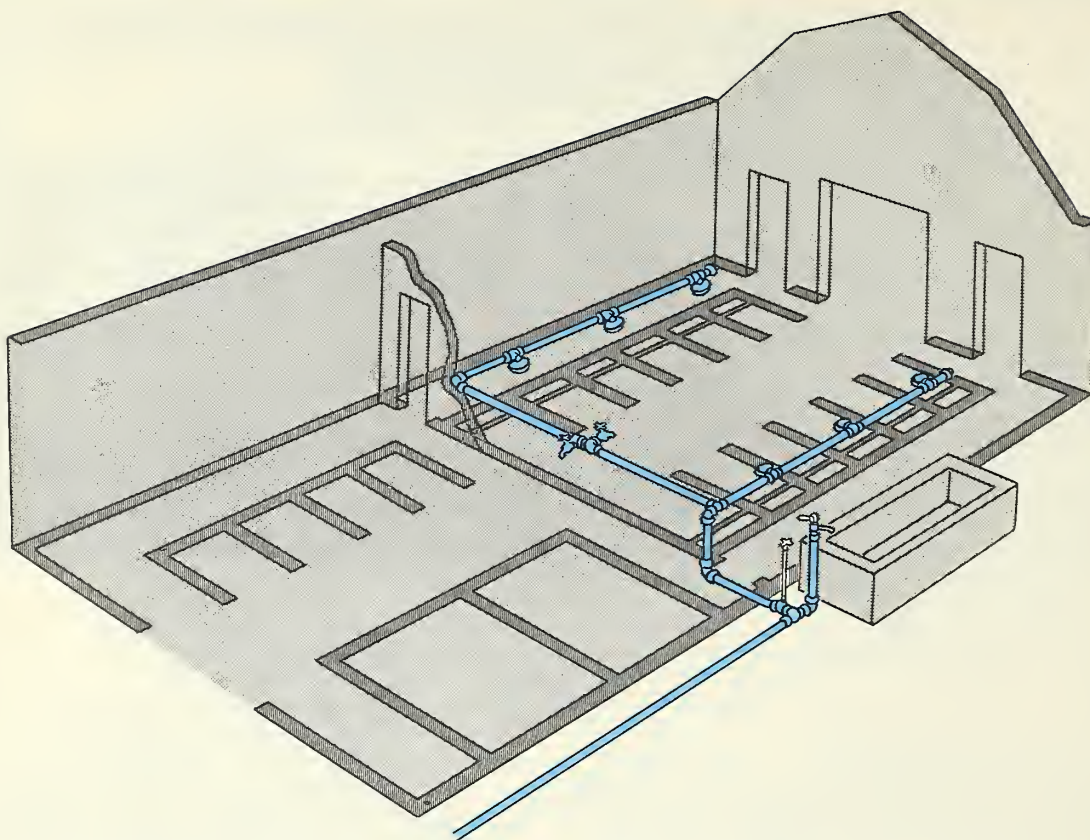
An acid-resisting finish on your sink will tend to prevent stains.

A sink or lavatory on the back porch, in the utility room or back hall, will provide a place to wash up as you come from your farm work, without making the kitchen sink or the bathroom untidy. You may have removed an old sink from the kitchen that would serve very well for this purpose. Or you may want to buy a lavatory for this purpose.

A room with a floor space about 5 by 6 feet would be usable for your bathroom, although a space $4\frac{1}{2}$ by 5 feet will provide for a bathroom with a shower bath. A bath tub can be used if there is 25 square feet of floor and the door swings outward. At least 30 square feet is needed if there is a bath tub and the door swings inward. You will also want a water closet and a lavatory in your bathroom.

For further details on bathroom planning, see the publication, "PLANNING YOUR BATH-

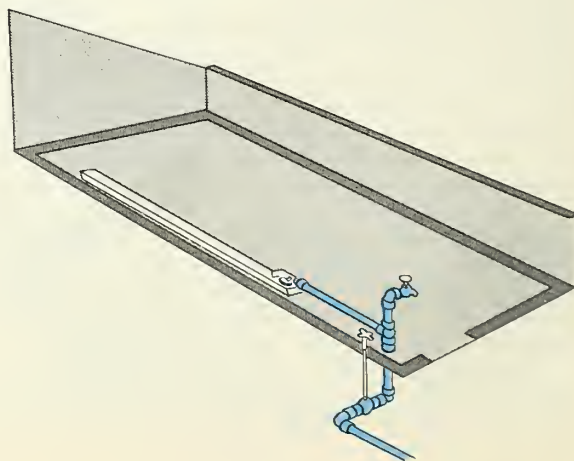
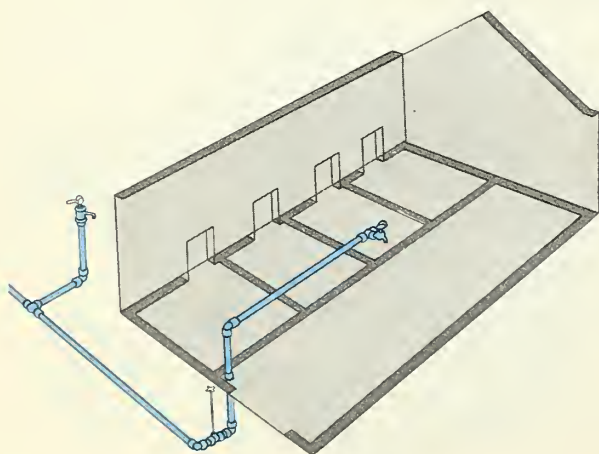




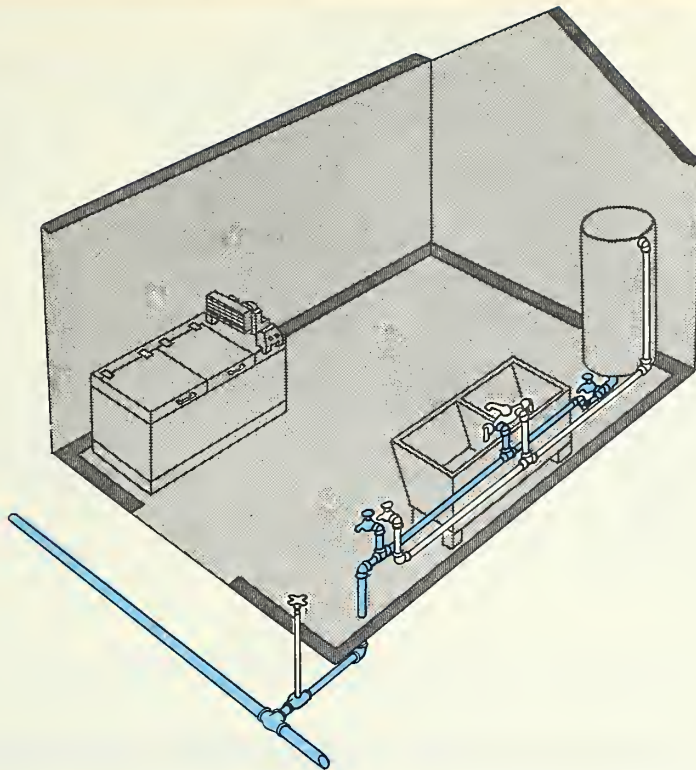
ROOM" in the "YOUR FARM HOUSE" series available from the U. S. Department of Agriculture, Washington 25, D. C.

You will want water in several of your buildings other than your house. In some buildings such as your hog house or your chicken house, your shop or your machine shed, one faucet or hydrant may be

enough. In places such as your dairy stable or your milk house, you may need several faucets. It is good practice to continue pipe the same size as your water-service pipe to one faucet, with a hose connection in each building. This will make it possible for you to use a hose to its full capacity for fire fighting, cleaning, and similar uses. Half-inch steel



WHERE YOUR SERVICE PIPING GOES

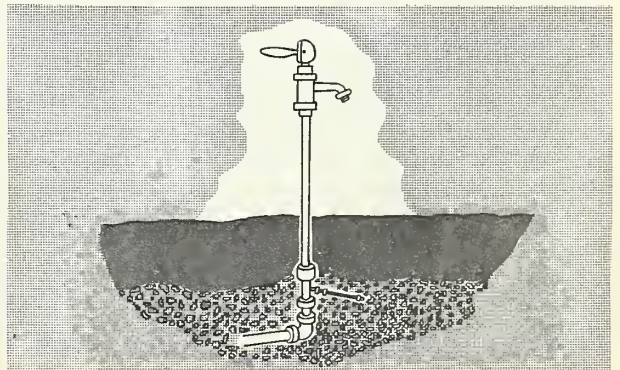
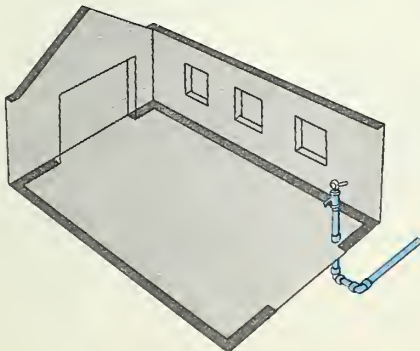


pipe or copper tubing will likely be adequate for the distribution piping to other faucets unless there are several that may be open at the same time, or the pipes are more than 50 feet long. Then it would be best to use $\frac{3}{4}$ -inch pipe or tubing.

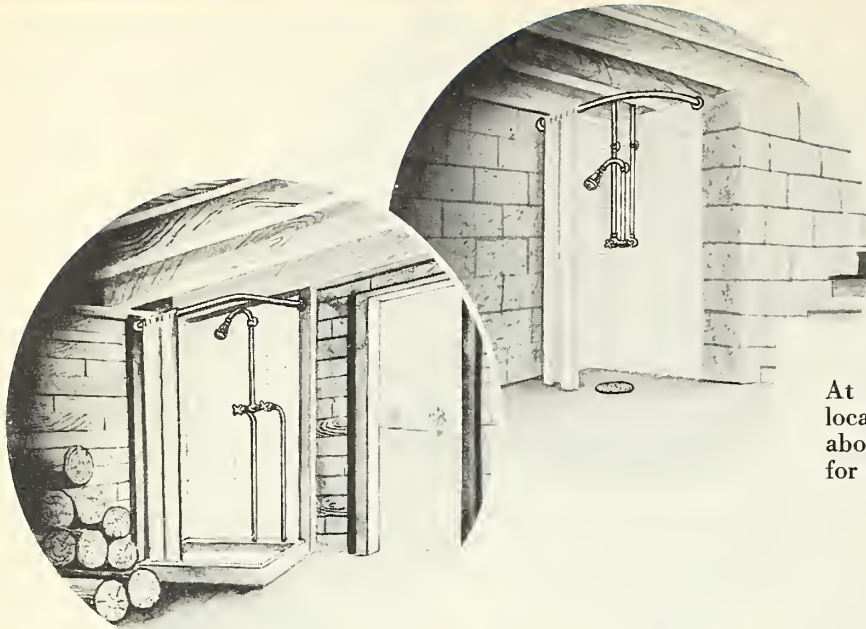
In all buildings where there is danger of the pipes freezing, you should install some means of draining the distribution pipes, such as a stop-and-waste valve between the service pipe and the distribution pipes. The stop-and-waste valve may be buried in the ground where your pipe enters the building and will allow all of the water in the distribution pipes to drain into the ground when it is closed by a handle extending above the ground.

In addition to bathing facilities in the main part of the house, most farms need a shower bath in the basement, in the woodshed, or in the wash house where the farm workers can clean up. You may use a regular bathroom shower compartment for this purpose. But if you have a concrete floor, a drain placed in the floor, a shower head, and a curtain rod with a curtain attached to the wall will make a satisfactory installation. (See next page.)

When you modernize your home, you will want a permanent location for stationary laundry tubs unless you use an automatic washer. The tubs may be in the basement, in a special laundry or utility room on the first floor, or in a separate wash house.



A SHOWER FOR FARM WORKERS



At left are two possible locations for a shower bath; above, two types of heads for showers.

WHERE TO PUT LAUNDRY TUBS

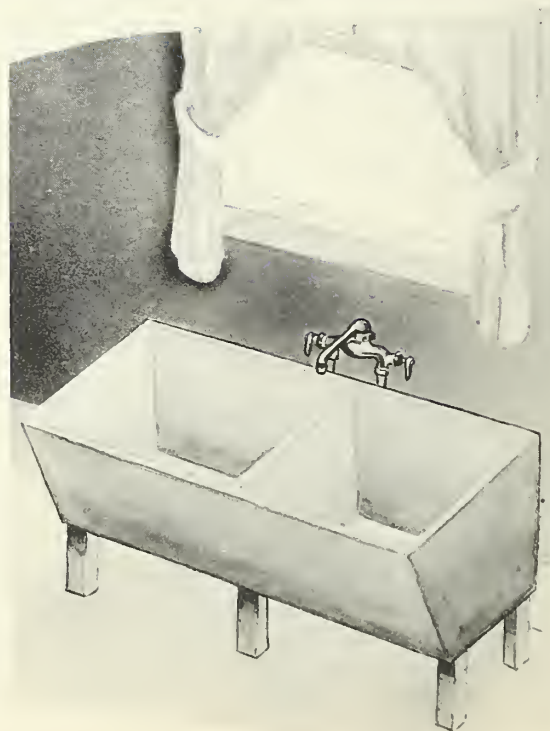
Your laundry tubs should be of a quality that fits with the rest of your equipment, but decoration beyond simple neatness is of little consequence. The most common tubs are made of cement composition, although soapstone, concrete, enameled cast iron, and porcelain ones are also available.

You will probably prefer a two-compartment tub since it provides for two rinses.

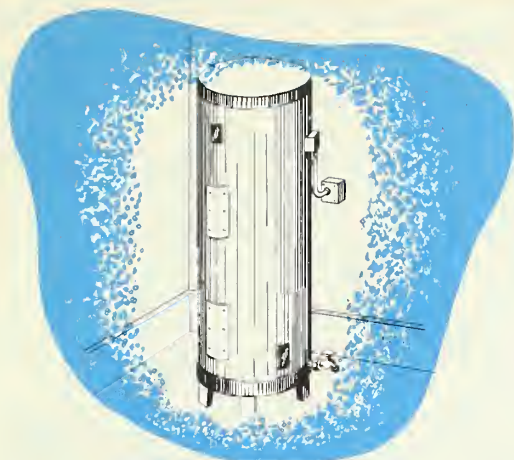
In addition to locating your tub so that it has proper drainage and hot and cold water, you will want to place it so that the clothes can be put through the wringer of your electric washing machine directly into the rinse water.

The cost of operating your electric water heater will depend on your electric rate and the amount of hot water that you use. Be sure that you get one that is big enough really to meet your needs. Many city families find 30-gallon and 40-gallon heaters large enough. But most farm families need larger ones—52 gallons or more. A large heater will hold enough hot water for washday and cleaning milk utensils as well as for the regular household needs of cooking and cleaning. You may also want a separate water heater in your milk house.

Be sure you check with your power supplier before buying your water heater. Often special low electric rates are available if certain types of heaters are put in. In some cases, certain types of heaters



WHAT ABOUT WATER HEATERS?



are discouraged because of the way that they put electrical load on the power line.

There are probably several places in your house where your water heater can be placed. Select the

one that will allow the shortest pipes from the heater to the faucets where hot water will be used most frequently. Each time that you use hot water, the pipes from your heater to the faucet will be heated and left full of hot water. The pipes and the water in them will cool before more hot water is used. This wasted heat is wasted electricity. If the hot water pipes are short where hot water is used most frequently, this loss will be least.

A complete electric storage heater consists of an inner tank which contains the heating elements and the water, and a round or square outer casing. The space between is filled with insulation. There is a thermostat to control each heating element. Some heaters have one heating element and one thermostat. Others have two heating elements and two thermostats. The latter are more popular on farms and in some cases are required by the power supplier.

You can expect your electric water heater to use about 250 kilowatt hours a month. However, consumption will vary considerably depending on the amount of hot water that you use.

MAKING WATER SOFT

Many farm families are accustomed to using hard well water for drinking and cooking, and soft rain water for washing. They want to continue to have soft water for washing after their complete plumbing is installed.

Completely separate water systems may be installed for the well water and the cistern water. However, if your well furnishes enough water, it is often cheaper to discard the cistern and install a water softener in the well-water system.

The most common water softeners are steel tanks filled with a special sand known as zeolite, through which the water flows. Zeolite removes from the water calcium and magnesium compounds which cause hardness. After a certain amount of water has been softened, the zeolite will not remove any more hardness. It is then necessary to place common salt in the softener and wash it slowly through the zeolite. This leaves the zeolite ready to soften water again.

There are several types of zeolite, each particularly suited to a certain type of water. Various other materials are sometimes used with the zeolite to remove iron and other undesirable materials from the water.

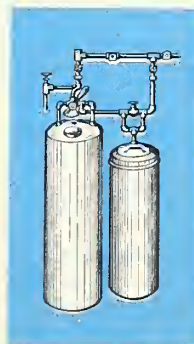
It will be wise to have a sample of the water tested in a competent laboratory before buying your softener. Most manufacturers of softeners have such laboratories and will make the test free of charge. You can then buy a softener with the proper zeolite and other materials to fit your particular water. This test will also tell you the amount or hardness in

the water so that you can get a softener that will only need regeneration about every 2 weeks.

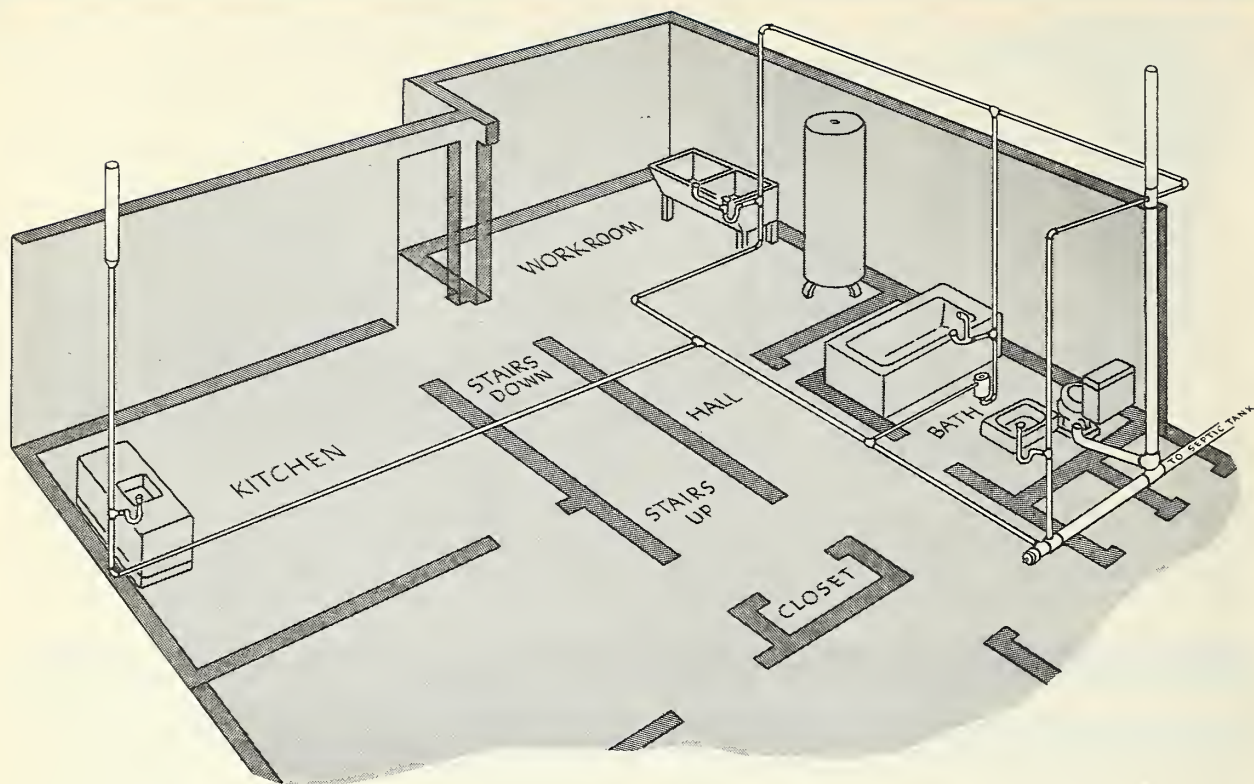
You will want to arrange the water pipes so that only the water for those faucets from which you want soft water will pass through the softener. Water for your water closet, for lawn and garden watering, and for other similar uses need not be softened. If you do not use softener for these purposes you will not have to regenerate the softener so frequently.

There is no cost for the operation of your zeolite softener except for the small amount of salt required for the periodic regenerations.

The waste disposal piping in your house is among the most important parts of your plumbing installation. To insure good sanitation and freedom from trouble, this piping should be of proper materials and put in properly. What you need in piping



DISPOSING OF HOUSE WASTES



depends on the fixtures you put in and the arrangement of your house.

Every fixture must waste through a trap so that sewer odors will not come back through your house.

Your kitchen sink and laundry tubs can drain into ordinary 4-inch field drain tile buried about 18 inches deep in your yard.

Your bathroom fixtures should drain into a septic tank.

The waste-disposal piping to your septic tank must be large enough to handle your bathroom wastes. It must be vented to the outside air at the top of the house to allow sewer gases to escape and to maintain atmospheric pressure throughout the piping. It may be necessary for you to provide branches from this main vent to various fixtures to prevent siphoning the water from the fixture traps.

Your house drain will end, and your yard sewer begin, about 5 feet outside of your house.

Your yard sewer will connect your house drain with your septic tank. It will be made either of cast-iron soil pipe, or clay or concrete sewer tile. Any part of a sewer that passes under a driveway or any other place where it would be subject to mechanical damage should be of extra heavy cast-iron soil pipe. The sewer must be watertight to the septic tank.

Except in unusual situations, a septic tank with a drain-tile disposal field is the most desirable means of disposing of bathroom wastes. Be sure to consult your local health officials before planning to use any other means, such as a cesspool. Septic tanks with their disposal fields will probably require the least amount of maintenance and are less likely to contaminate the water supply.

A septic tank is a closed watertight chamber in which the sewage remains long enough for most of the solid matter to decompose or settle out. The gases escape through vents, through the soil of the disposal field, or through the house drain and main vent in the house. The bacteria which bring about this decomposition are anaerobic; that is, they live where there is no air. For this reason, it is necessary that the septic tank be so constructed that neither the incoming or outgoing sewage agitate the contents enough to mix air with it. This is sometimes done by placing baffles in the tank so that the flow through the incoming and outgoing pipes will not stir up the main contents. It is accomplished in other tanks by having the incoming sewage deposited straight downward several inches below the surface of the contents and having the outgoing sewage taken straight upward from about 18 inches below the surface at the other end of the tank.

PLANNING DISPOSAL FIELD FOR THE SEPTIC TANK

Your septic tank may be made of concrete, tile, steel, or brick. Some authorities estimate that the life of No. 12 gage steel tanks averages about 10 to 15 years. A well-built concrete or tile tank can last indefinitely.

Your entire sewage system must be of watertight construction wherever there is danger of seepage reaching the water supply. The distance which should separate all sewage seepage and your well will depend on local conditions, but in most cases should be at least 100 feet. It would be well for you to discuss this with your local health authorities.

A septic tank does not make sewage fit to drink. It is merely a settling basin in which solids are decomposed. The liquid that flows from a septic tank is still sewage. Purification takes place in the soil after the sewage has seeped from the disposal tile and has been acted on by aerobic soil organisms.

No "starter" or other material need be put in your septic tank to start its functioning. All of the organisms that are needed will be there naturally without any assistance on your part.

Unless you live in a very cold part of the country where the ground freezes to a depth of 5 or 6 feet, your septic tank disposal field should be made of 4-inch drain tile buried about 18 to 24 inches in the soil. If you live in one of these very cold areas, you should discuss your disposal field problems with your local health authorities or your county agent to determine the most satisfactory system. You may find that it is better, under your cold conditions, to use a seepage pit instead of lines of seepage tile,

or to place several feet of gravel under your seepage tile lines.

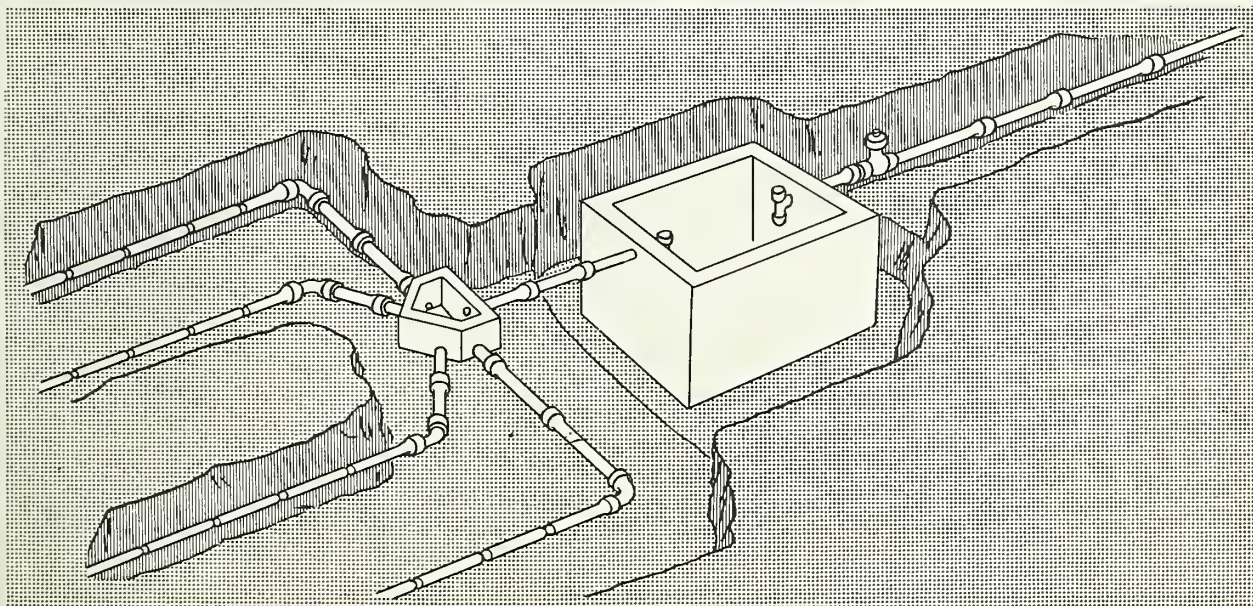
Many disposal fields consist of a single line of tile, but it is usually better practice to have the outlet of the septic tank fork at a distribution box into two or more branches. This will reduce the danger of the tile near the septic tank becoming clogged and the soil becoming waterlogged while that farther away receives no sewage.

The tile lines in your disposal field should be spaced at least 6 feet apart. If you have plenty of room, a spacing about 10 feet apart would be better.

You should place a bed of gravel at least 6 inches deep and the full width of the trench under the disposal tile.

Since the rate at which the soil will absorb the sewage will depend on the width of the gravel bed under the tile, the amount of tile you will need will depend on how wide you dig the trench. You will probably use a trench 18 to 24 inches wide at the bottom. The number of square feet of gravel needed in the bottom of the trench can best be determined by a percolation test, but in the smallest installation in the most porous soil, it should be at least 150 square feet.

Consult your co-op advisers, your county agent or your local health officials on the amount of tile and gravel you will need, according to the soil type on your farm. Additional information may also be obtained from Farmers' Bulletin 1950, "SEWAGE AND GARBAGE DISPOSAL ON THE FARM" available from the U. S. Department of Agriculture, Washington 25, D. C.



**RURAL ELECTRIFICATION ADMINISTRATION
U. S. DEPARTMENT OF AGRICULTURE**

